

Welcome to the
Engineering Department
at CERN

Ingo Ruehl, HE Group Leader, 5th April 2016

Who are we ???

Conseil Européen pour la Recherche Nucléaire World largest Particle Physics Laboratory (1954)

Yearly Budget

~1100 MCHF (~ 1000 MEUR)

*Experiments financed
externally.*



Personnel

2300 Staff
730 Fellows &
Associates
200 Students

11000 Users from
500 universities

2000 External
companies

21 Member Countries

Austria, Belgium, Bulgaria, Check Republic, Denmark, Finland, France, Germany, Greece, Italia, Israel, Hungary, Holland, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, UK.

7 Observers Countries

EU, USA, Russia, India, Japan, Turkey, UNESCO

2 Candidate Countries

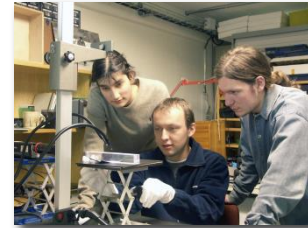
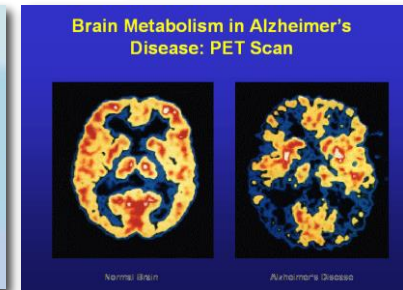
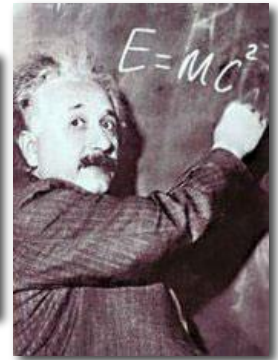
Romania and Serbia

1 Associate Country

Pakistan

The Missions of CERN

- Push forward the frontiers of knowledge
e.g. the secrets of the Big Bang ... what was the matter like within the first moments of the Universe's existence?
- Develop new technologies for accelerators and detectors
Information technology - the Web and the GRID
Medicine - diagnosis and therapy
- Train the scientists and the engineers of tomorrow
- Unite people from different countries and cultures



The instruments used

1. Particle accelerator :

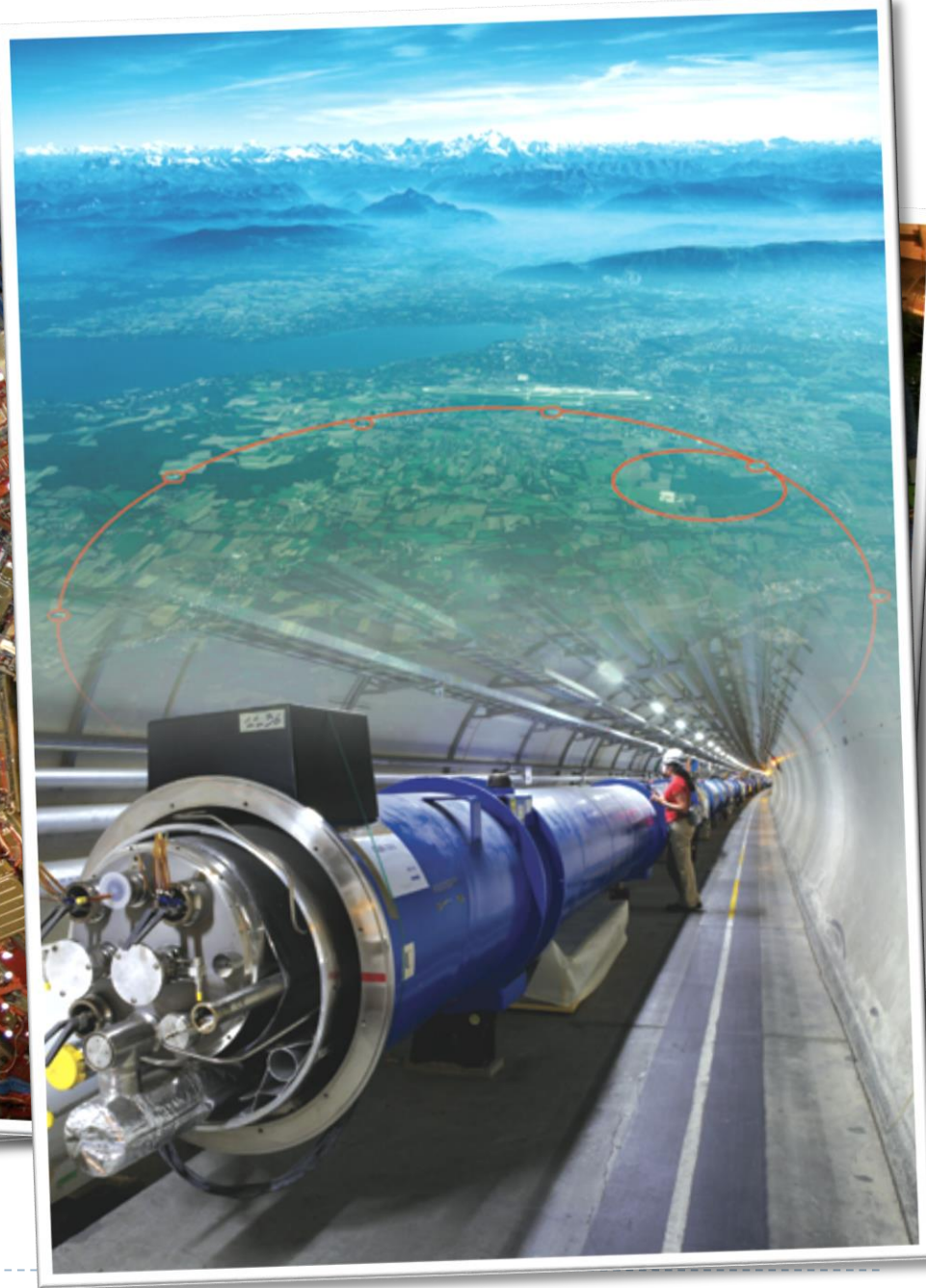
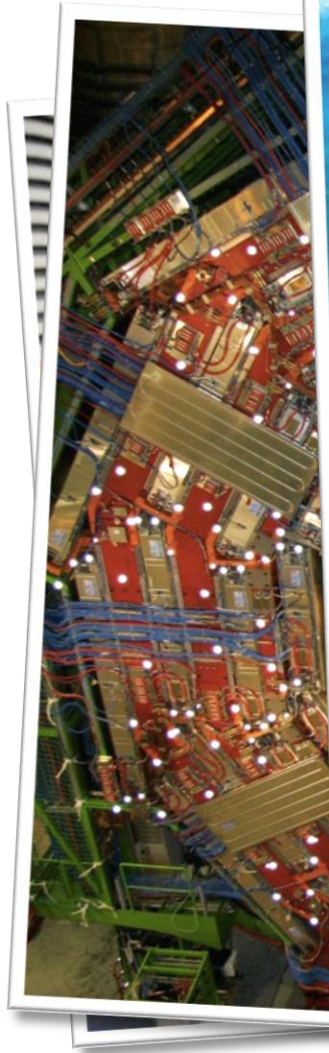
Boost particles to high energies and make them collide

2. Detectors :

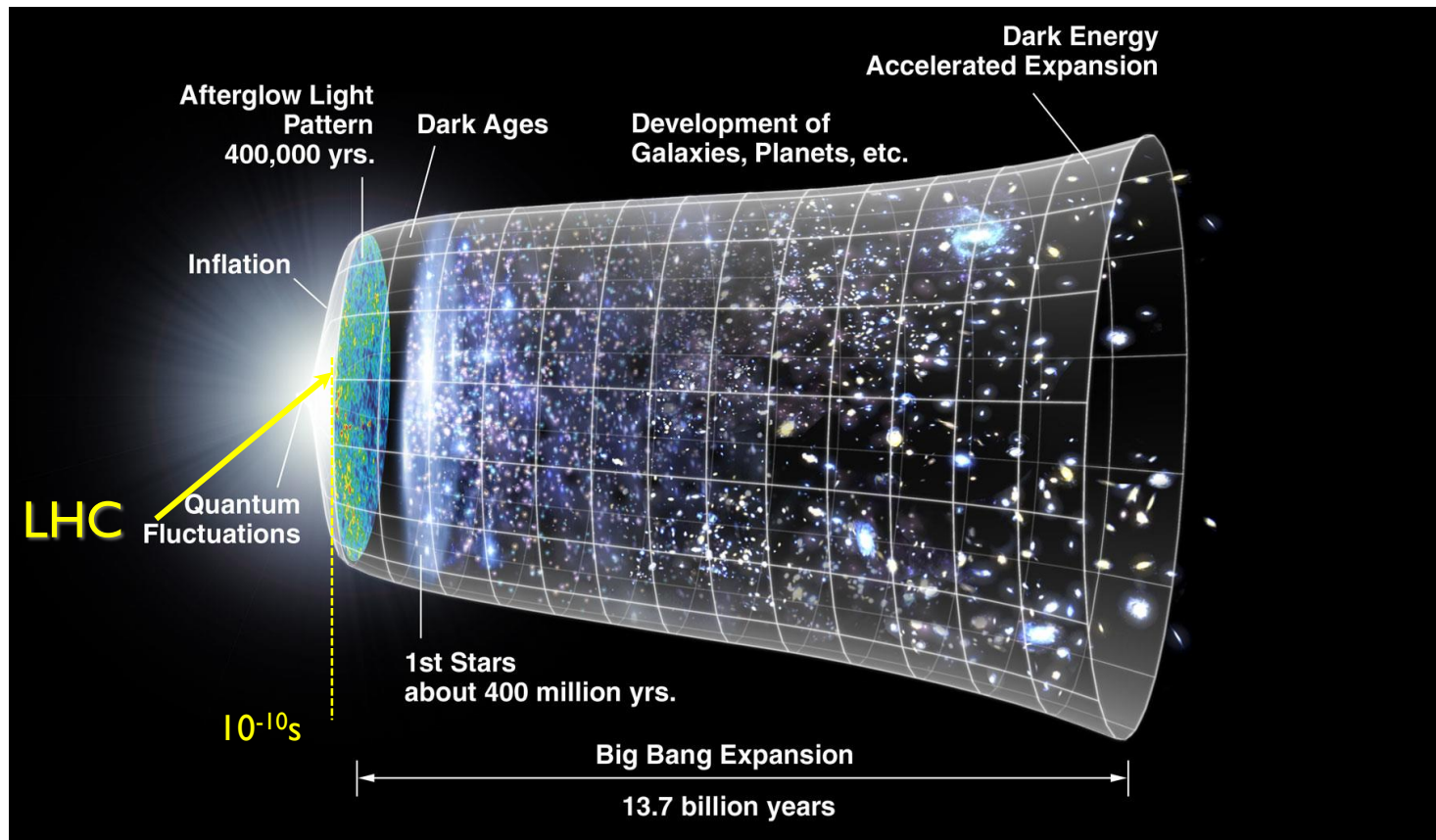
Gigantic instruments that observe and record the results of the collisions (particle trajectories, energy, charge...)

3. Computers :

Collect, store, and send around the world the big quantity of data received from the detectors for data analysis

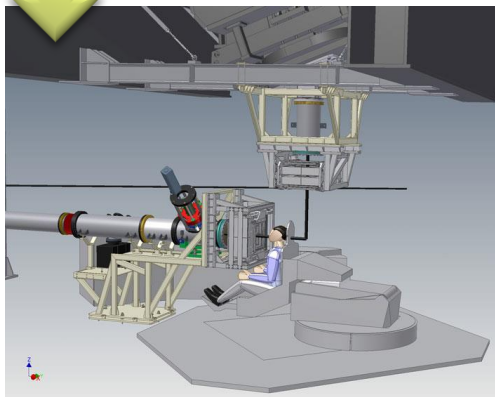
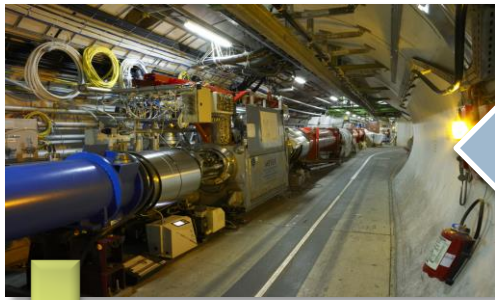


The next scientific challenge is to understand the very first moments of our Universe after the Big Bang



The technologies developed at CERN generate innovation

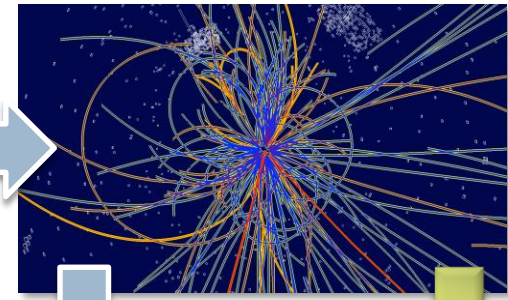
Accelerators



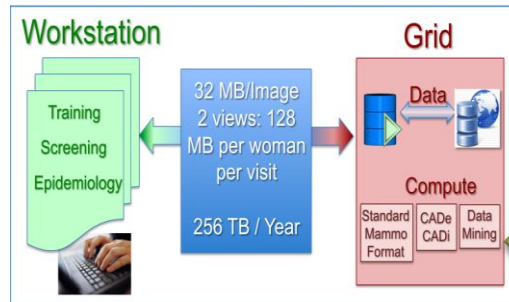
Hadron therapy



Detectors



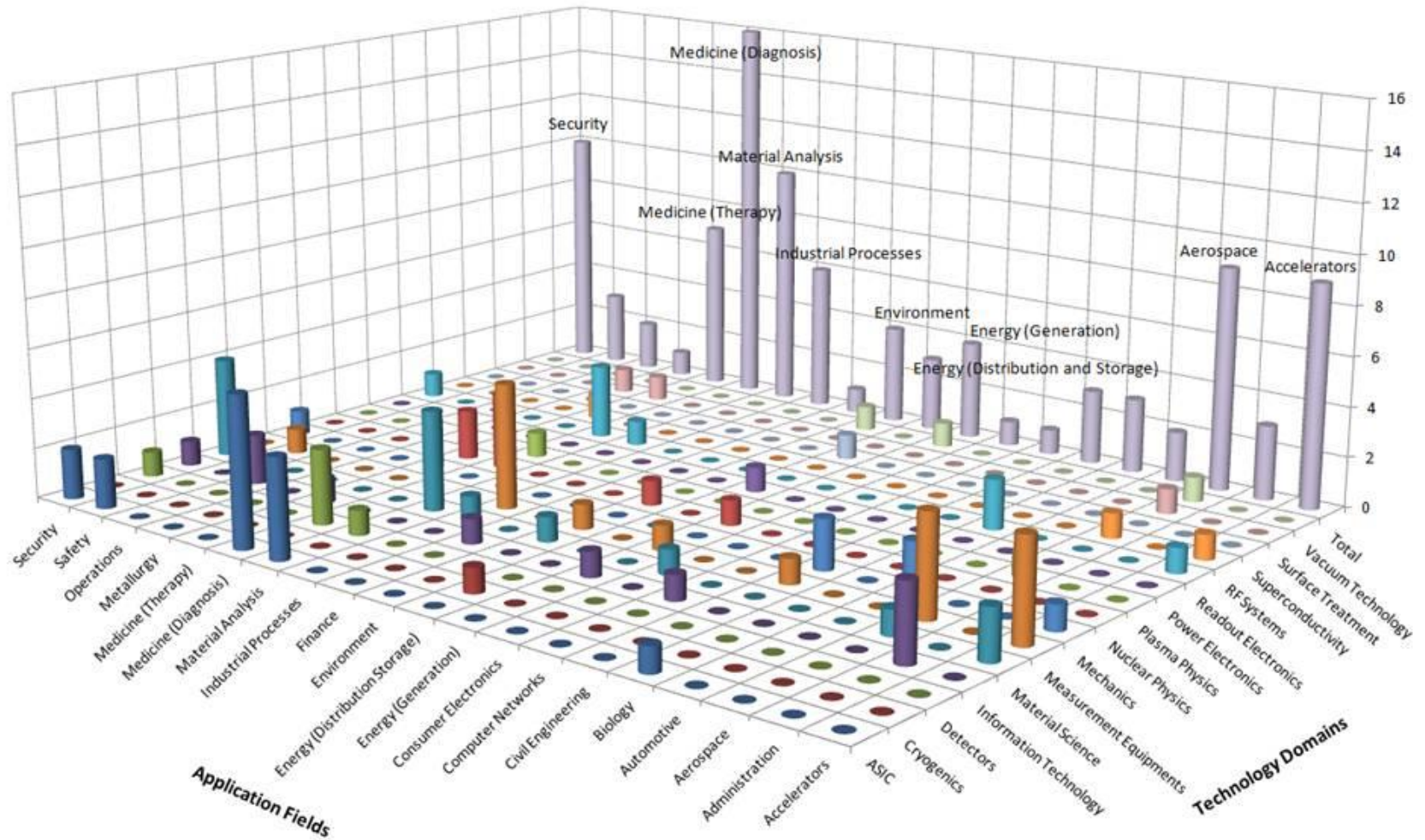
CAT



The Computing Grid

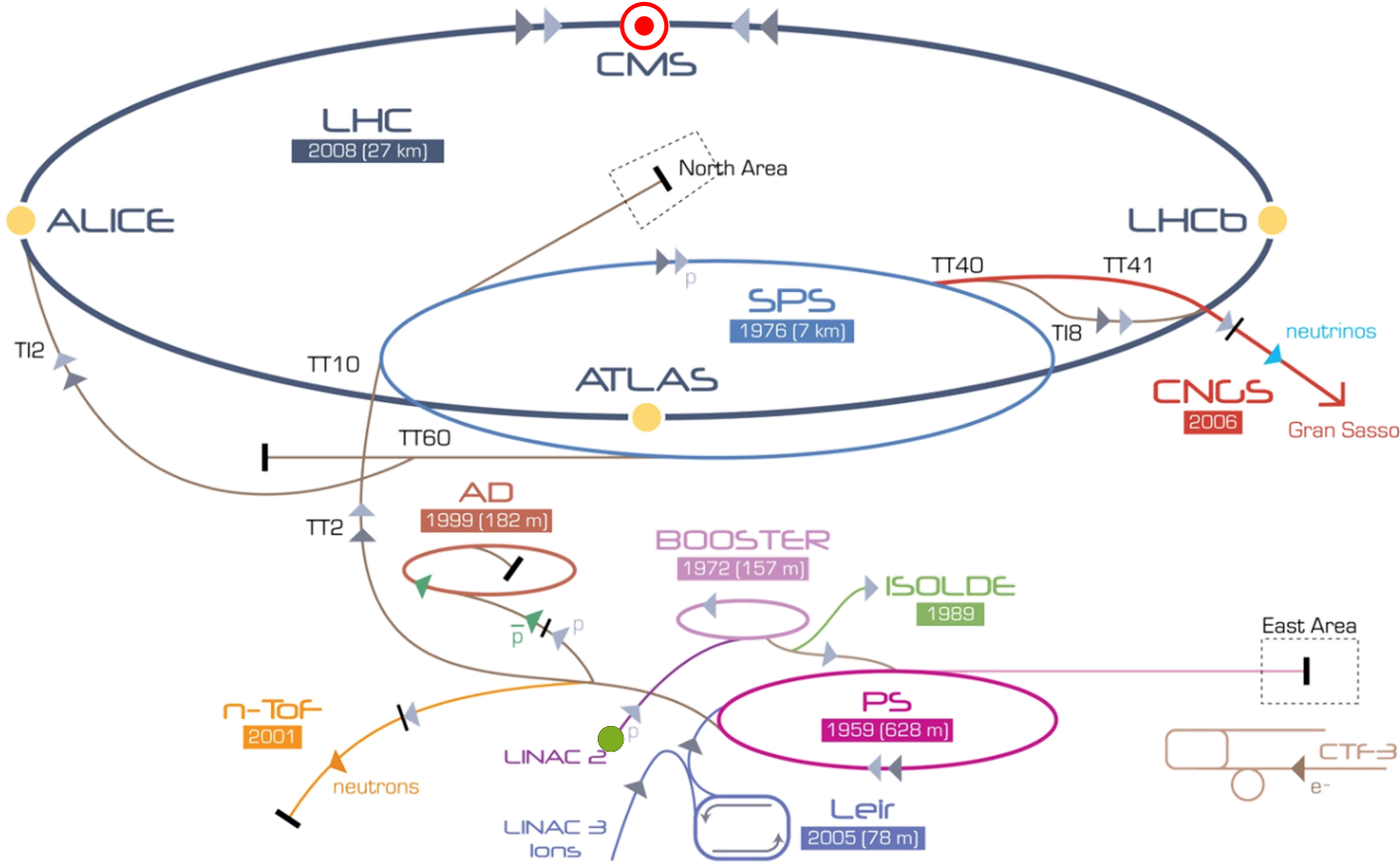


The impact of the technologies developed at CERN



The CERN Accelerator Complex

▶ LHC, A huge machine accelerating tiny particles...



▶ p (proton) ▶ ion ▶ neutrons ▶ \bar{p} (antiproton) \leftrightarrow proton/antiproton conversion ▶ neutrinos ▶ electron

LHC Large Hadron Collider SPS Super Proton Synchrotron PS Proton Synchrotron
 AD Antiproton Decelerator CTF-3 Clic Test Facility CNCS Cern Neutrinos to Gran Sasso ISOLDE Isotope Separator OnLine DEvice
 LEIR Low Energy Ion Ring LINAC LINear ACcelerator n-ToF Neutrons Time Of Flight

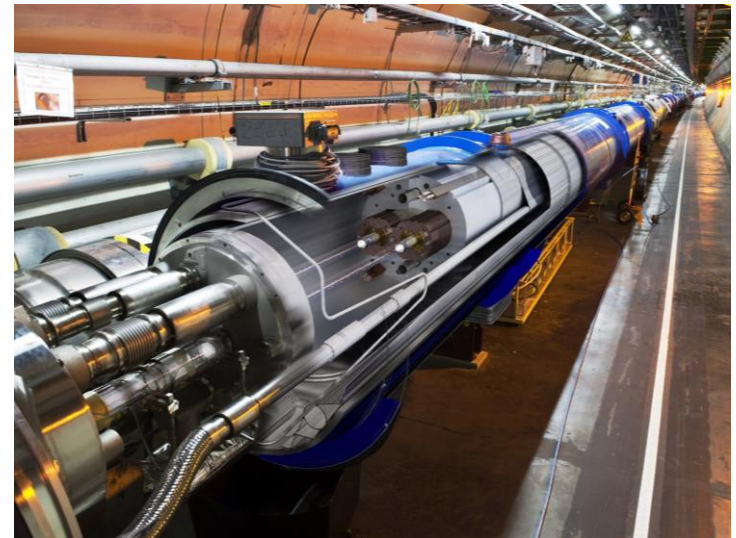
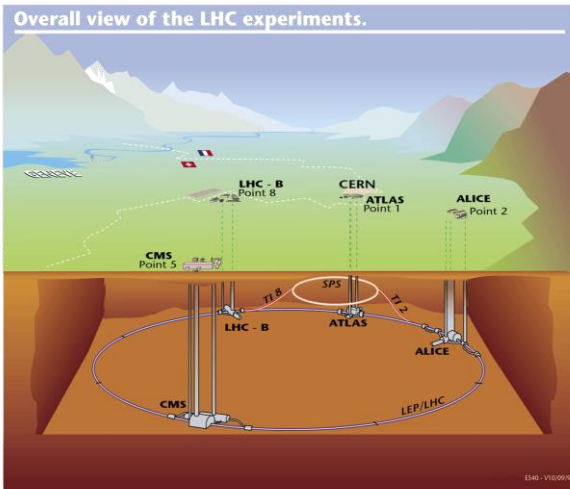


The LHC

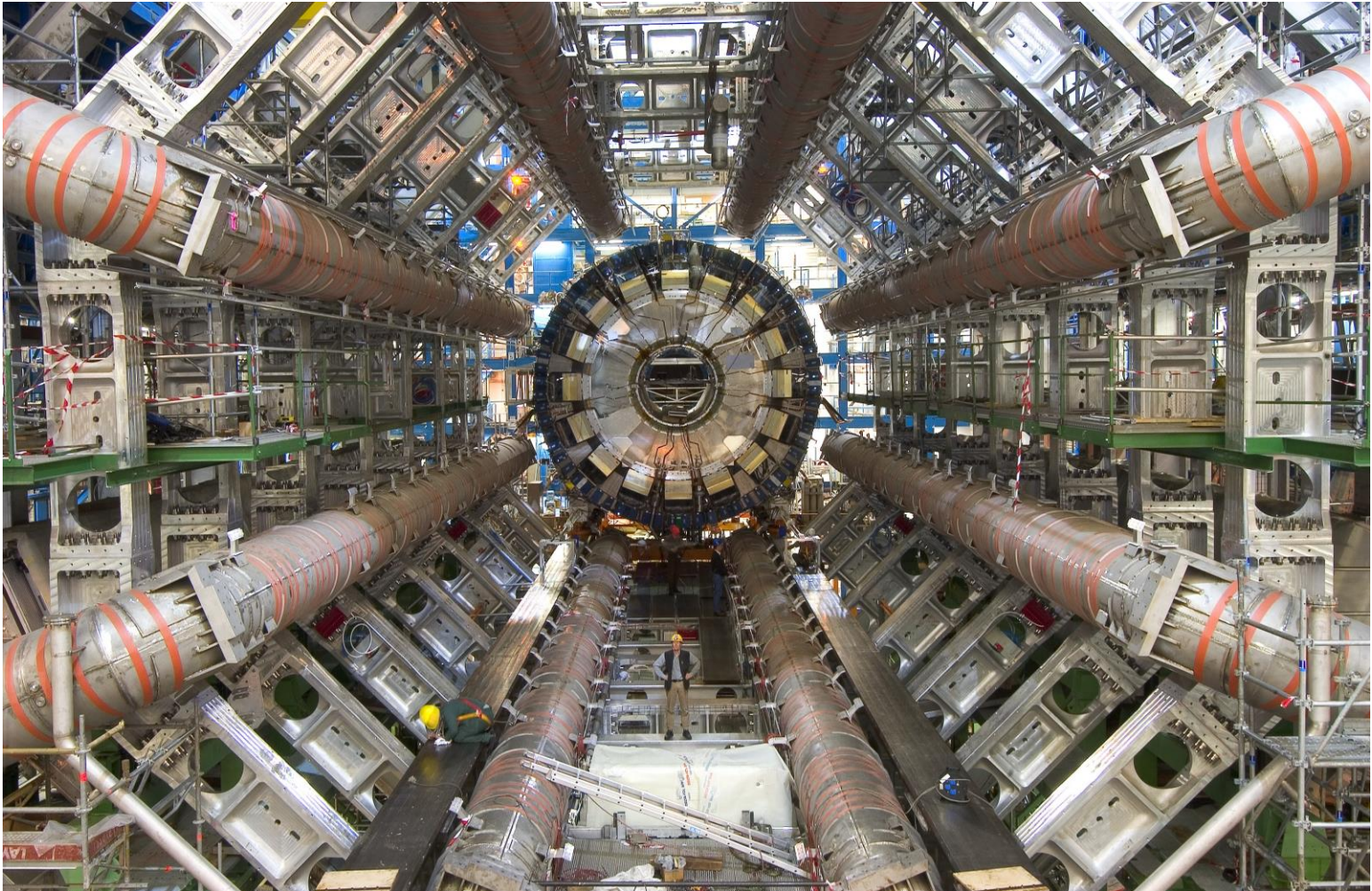
A collider situated in an underground 27 km in an almost circular tunnel designed to accelerate two proton beams to 7 TeV

+ than 25 years

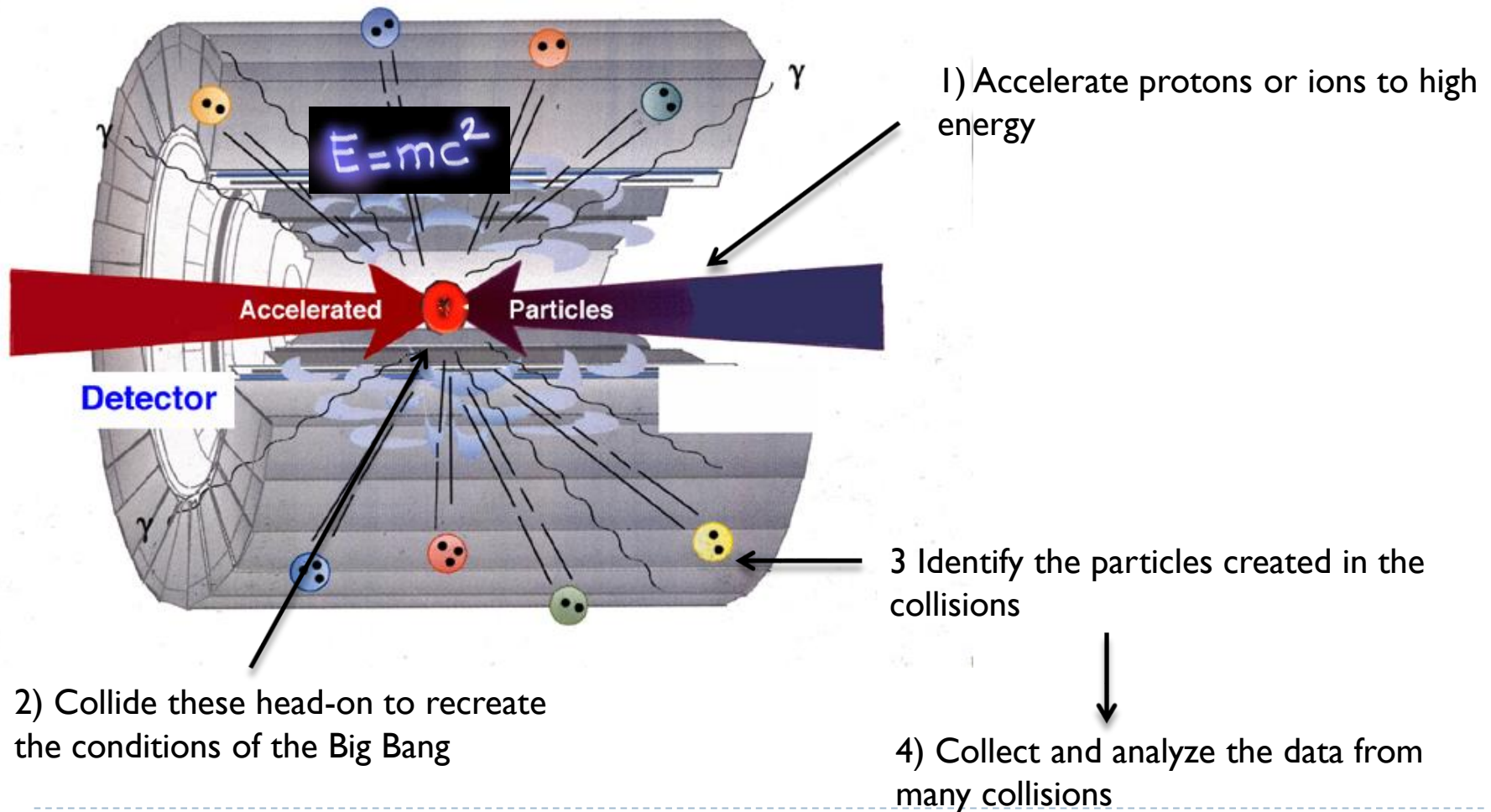
- 1982 : First studies
- 1994 : Project Approved by the CERN Council
- 1996 : Final Decision and start of the construction
- 2004 : Installation Starts
- 2006 : Hardware Commissioning Starts
- 2008 : End of Hardware Commissioning
- 2009-2030: Physics



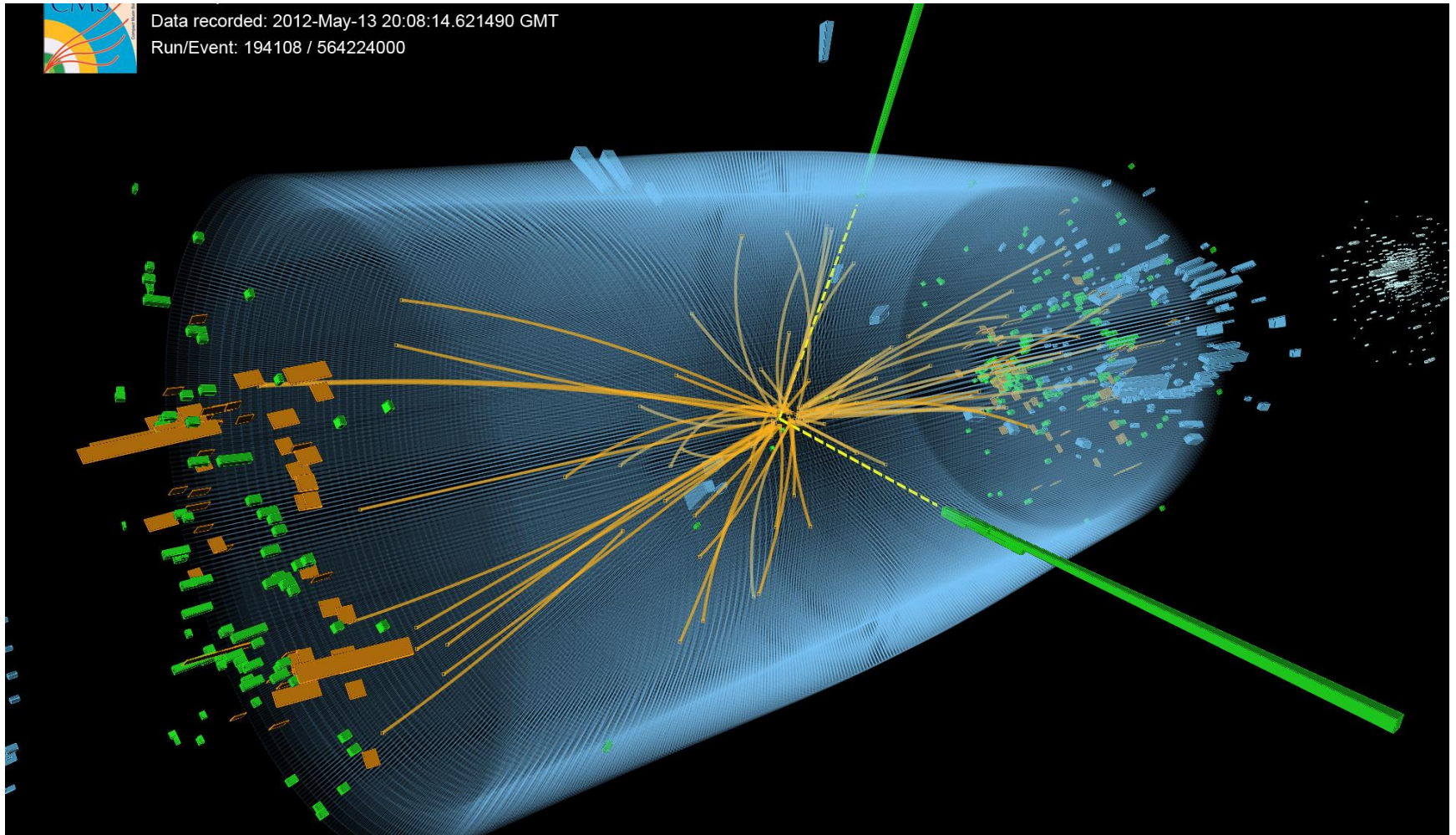
A Big Experiment at the LHC : ATLAS



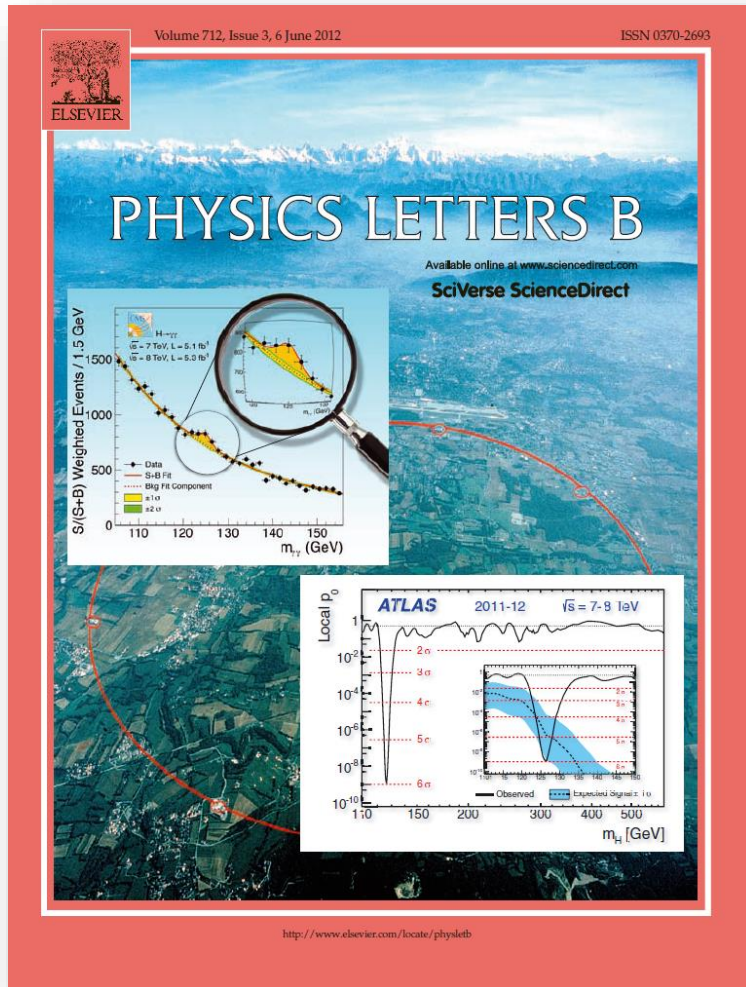
How do we study the elementary particles?



H \rightarrow $\gamma\gamma$



2012 : The year of the Higgs Boson



Occupational health and safety in EN

At CERN Safety is our highest priority!

To be allowed to work on CERN sites you must complete basic safety training.

You find it in the Safety Information Registration application, Type SIR in your browser's address window.

More advanced safety training is needed to perform certain tasks or to access certain areas.

The list is found in the HR webpage

The screenshot shows the SIR - Safety Information Registration application. It features a header with the CERN logo and the title 'SIR - Safety Information Registration'. Below the header, there is a welcome message and a list of available courses and their current status. The courses are listed in a table with columns for 'Available courses and their current status' and 'Course description'. The status of each course is indicated by a checkmark or an 'X'. To the right of the course list, there are sections for 'Your safety contacts' and 'Your access authorizations'. The 'Your safety contacts' section lists several individuals with their names and roles. The 'Your access authorizations' section includes a link to 'ADaMS' and a message stating 'There are no active news'.

The screenshot shows the Human Resources Department webpage. It features a header with the CERN logo and the title 'Human Resources Department'. Below the header, there is a navigation menu with links for 'General Information', 'Recruitment', 'Training', 'Staff Career', 'Services', and 'CERN Official Documents'. The 'Training' link is circled in red. Below the navigation menu, there is a section for 'General Information' with a list of links: 'HR structure, Statistics, HR key contacts, CERN Code of Conduct, HR Bulletin Articles, Dates of Official Holidays'. To the right of this section, there is a section for 'CERN Official Documents (internal)' with a list of links: 'Staff Rules & Regulations, Procedures, Forms, Administrative & Operational Circulars'. Further to the right, there is a section for 'News' with a link to 'The new Careers at CERN site has gone live (April 2013)'. The webpage also includes a search bar and a language selector.

Occupational health and safety in EN

Your role in safety:

You are responsible for your own safety! If you take risks you are at fault. By taking up work at CERN you agree to work at minimum risk, and do everything to obtain the information that you need to do so.

Your supervisors role in safety:

Your supervisor is responsible for the safety of your activities. Do not make his life difficult: Respect the rules; respect the signs!

Surely you would not ignore this sign?



So why ignore this one?
This is also for your safety



Occupational health and safety in EN

Radiation safety

In the EN department there is a Radiation Safety Officer, or RSO. Each group has Radiation Support Safety Officers, or RSSO. Their job is to help their colleagues to prepare interventions in radiation areas.



Access Control

The access to many areas at CERN, in particular underground, is controlled. In order to access these areas you need to complete the required safety training. Once you have done so, you must request access. When access has been granted by the access controller of the area, you may access.

Do not forget the obligatory Personal Protection Equipment!

Occupational health and safety in EN

Should you witness, or be notified of, an accident or incident, you should immediately notify your DSO of your department. Find out who they are, so you can report the incident to them.

The screenshot shows the CERN EDH website navigation menu. At the top, there are links for Home, Tasks, Search, and News. Below this, there is a 'News' section with a headline: 'In light of the upcoming 2016 CERN reorganization, the EDH team are currently contacting departmental DSOs to discuss the impact of the reorganization on their departmental safety procedures.' Below the news section, there is a 'Tasks' section with three icons: 'Other Tasks', 'AOC Overview', and 'AOC Overview (TID)'. A red arrow points to the 'AOC Overview' icon.

The screenshot shows the 'Internal Accident Report' form. The form is titled 'Internal Accident Report' and is created by John PEDERSEN (EN-HDO) on 16.11.2015. The applicable administrative procedure is 'Accidents'. The form is divided into several sections: 'What', 'When', 'Where', 'Who', and 'Any other Information'. The 'What' section includes fields for 'Type of Safety Issue' (Accident, Personal Accident, Near miss, Hazardous Situation), 'Short description', and 'Detailed Description'. The 'When' section includes fields for 'Date' and 'Time'. The 'Where' section includes fields for 'On CERN site' (No), 'Details about the location', and 'Worksite' (No). The 'Who' section includes a table with columns for 'Context', 'Name', and 'Details', and a '+Add' button. The 'Any other Information' section is a large text area for additional details.

2016 Injector Accelerator Schedule

Approved by the Research Board - September 2015

| | Jan | | | Feb | | | Mar | | | | | | | |
|----|----------------------|---|---|-----------------------------|---|---|-------------|---|---|------------|----|-------------|----|-------------|
| | Controls maintenance | | | Start ion source and Linac2 | | | Beam to PSB | | | Beam to PS | | Beam to SPS | | Beam to LHC |
| Wk | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | |
| Mo | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | |
| Tu | 4 | 5 | | | | | | | | | | | | |
| We | 6 | 7 | | | | | | | | | | | | |
| Th | | | | | | | | | | | | | | |
| Fr | | | | | | | | | | | | | | |
| Sa | | | | | | | | | | | | | | |
| Su | | | | | | | | | | | | | | |

| | Apr | | | May | | | June | | | | | | |
|----|--|----|----|-------------------------|----|----|------------------|----|----|-------------------------|----|----|----|
| | Beam to AD Start NA setup ISOLDE, nTOF, EA setup | | | Start NA proton physics | | | Start AD physics | | | Start physics East Area | | | |
| Wk | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| Mo | | | | | | | | | | | | | |
| Tu | | | | | | | | | | | | | |
| We | | | | | | | | | | | | | |
| Th | | | | | | | | | | | | | |
| Fr | | | | | | | | | | | | | |
| Sa | | | | | | | | | | | | | |
| Su | | | | | | | | | | | | | |

| | July | | | Aug | | | Sep | | | | | | |
|----|---------------------------|----|----|-----|----|----|------------|----|----|-------------|----|----|----|
| | Start AWAKE commissioning | | | | | | Ions to PS | | | Ions to SPS | | | |
| Wk | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| Mo | | | | | | | | | | | | | |
| Tu | | | | | | | | | | | | | |
| We | | | | | | | | | | | | | |
| Th | | | | | | | | | | | | | |
| Fr | | | | | | | | | | | | | |
| Sa | | | | | | | | | | | | | |
| Su | | | | | | | | | | | | | |

| | Oct | | | Nov | | | Dec | | | | | | |
|----|---------------------|----|----|--------------------|----|----|-------------|----|----|--------------------|----|----|----|
| | Start AWAKE physics | | | End proton physics | | | Ions to LHC | | | End of run (06:00) | | | |
| Wk | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 |
| Mo | | | | | | | | | | | | | |
| Tu | | | | | | | | | | | | | |
| We | | | | | | | | | | | | | |
| Th | | | | | | | | | | | | | |
| Fr | | | | | | | | | | | | | |
| Sa | | | | | | | | | | | | | |
| Su | | | | | | | | | | | | | |



LHC Schedule 2016

Approved by the Research Board, December 2015

| | Jan | | | Feb | | | | Mar | | | | | |
|----|-----|----|----|-------------------------|---|---|----|-----|----|----------------|-------------------|---------------------------|----|
| Wk | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| Mo | 4 | 11 | 18 | 25 | 1 | 8 | 15 | 22 | 29 | 7 | 14 | 21 | 28 |
| Tu | | | | | | | | | | | | | |
| We | | | | | | | | | | Powering tests | | Recommissioning with beam | |
| Th | | | | Year end technical stop | | | | | | | | | |
| Fr | | | | | | | | | | | Machine check-out | G. Friday | |
| Sa | | | | | | | | | | | | | |
| Su | | | | | | | | | | | | | |

| | Apr | | | May | | | | June | | | | | |
|----|-----|----|---------|-----|--------------|----|-------|------|------|-----|----|---------------------|----|
| Wk | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| Mo | 4 | 11 | 18 | 25 | 1 | 8 | 15 | 22 | 29 | 6 | 13 | 20 | 27 |
| Tu | | | | | | | White | 16 | 23 | | | | |
| We | | | | | | | | | | TS1 | | | |
| Th | | | | | Ascension | | | | | | | Special physics run | |
| Fr | | | | | May Day comp | | | | MD 1 | | | | |
| Sa | | | | | | | | | | | | | |
| Su | | | 1st May | | | | | | | | | | |

| | July | | | Aug | | | | Sep | | | | | |
|----|------|----|----|------|----|----|----|-----|-----|----------|----|---------------------|----|
| Wk | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| Mo | 4 | 11 | 18 | 25 | 1 | 8 | 15 | 22 | 29 | 6 | 13 | 20 | 27 |
| Tu | | | | | | | | | | | | | |
| We | | | | MD 2 | | | | | TS2 | MD 3 | | | |
| Th | | | | | | | MD | | | Jeune G. | | Special physics run | |
| Fr | | | | | | | | | | | | | |
| Sa | | | | | | | | | | | | | |
| Su | | | | | | | | | | | | | |

| | Oct | | | Nov | | | | Dec | | | | | |
|----|-----|----|----|------|----|-----|------------|-----|----------------|----|----------------------------------|------------|----------|
| Wk | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 |
| Mo | 3 | 10 | 17 | 24 | 31 | 7 | 14 | 21 | 28 | 5 | 12 | 19 | 26 |
| Tu | | | | | | | | | | | | | |
| We | | | | | | TS3 | Ions setup | | | | Extended year end technical stop | | |
| Th | | | | | | | | | Ion run (p-Pb) | | | Lab closed | |
| Fr | | | | MD 4 | | | | | | | | | |
| Sa | | | | | | | | | | | | | |
| Su | | | | | | | | | | | | Xmas | New Year |

Technical Stop

Machine development

Recommissioning with beam

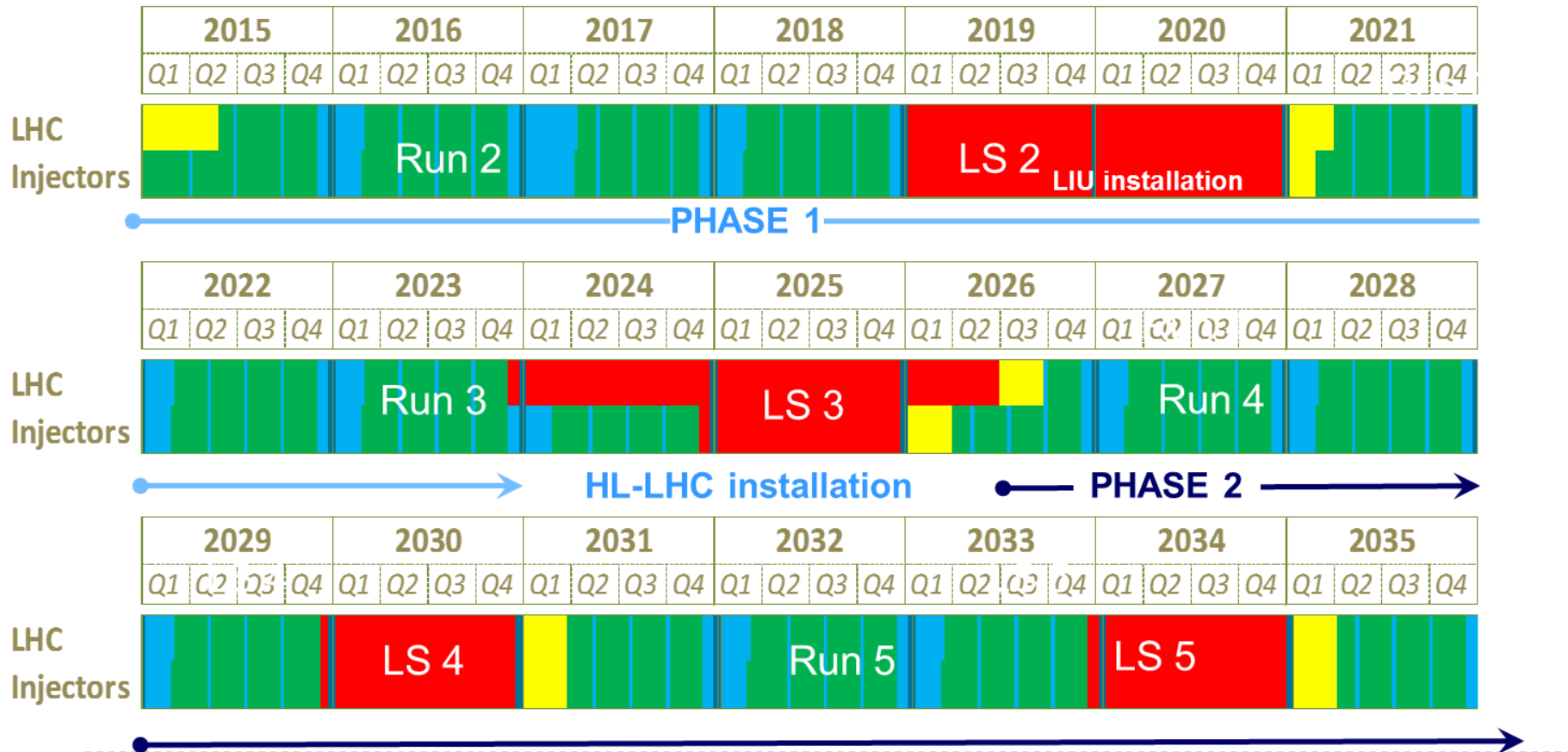
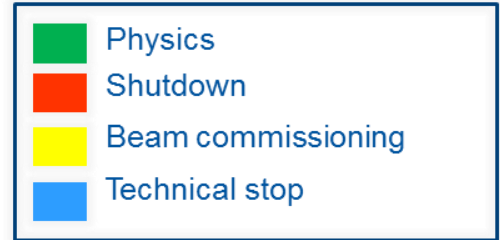
Special physics runs - schedule to be established

Scrubbing (indicative - dates to be established)

A longer term perspective

LHC roadmap: according to MTP 2016-2020 V1

LS2 starting in 2019 => 24 months + 3 months BC
 LS3 LHC: starting in 2024 => 30 months + 3 months BC
 Injectors: in 2025 => 13 months + 3 months BC



Directorate in 2016

Director-General

Fabiola Gianotti

Director of International Relations

Charlotte Lindberg Warakaulle

Director for Research and Computing

Eckhard Elsen

Director for Accelerators and
Technology

Frédéric Bordry

Director for Finance and Human
Resources

Martin Steinacher

Directorate in 2016

Director-General

Fabiola Gianotti

Director of International Relations

Charlotte Lindberg Warakaulle

Director for Research and Computing

Eckhard Elsen

Director for Accelerators and
Technology

Frédéric Bordry

Director for Finance and Human
Resources

Martin Steinacher

Heads of departments in 2016

Experimental Physics

Manfred Krammer

Theoretical Physics

Gian Giudice

Information Technology

Frederic Hemmer

Directorate in 2016

Director-General

Fabiola Gianotti

Director of International Relations

Charlotte Lindberg Warakaulle

Director for Research and Computing

Eckhard Elsen

Director for Accelerators and
Technology

Frédéric Bordry

Director for Finance and Human
Resources

Martin Steinacher

Heads of departments in 2016

Beams – BE

Paul Collier

Technology – TE

José Miguel Jimenez

Engineering – EN

Roberto Losito

Directorate in 2016

Director-General

Fabiola Gianotti

Director of International Relations

Charlotte Lindberg Warakaulle

Director for Research and Computing

Eckhard Elsen

Director for Accelerators and
Technology

Frédéric Bordry

Director for Finance and Human
Resources

Martin Steinacher

Heads of departments in 2016

Human Resources

Anne-Sylvie Catherin

Finance and Administrative Process

Florian Sonnemann

Industry, Procurement and Knowledge
Transfer

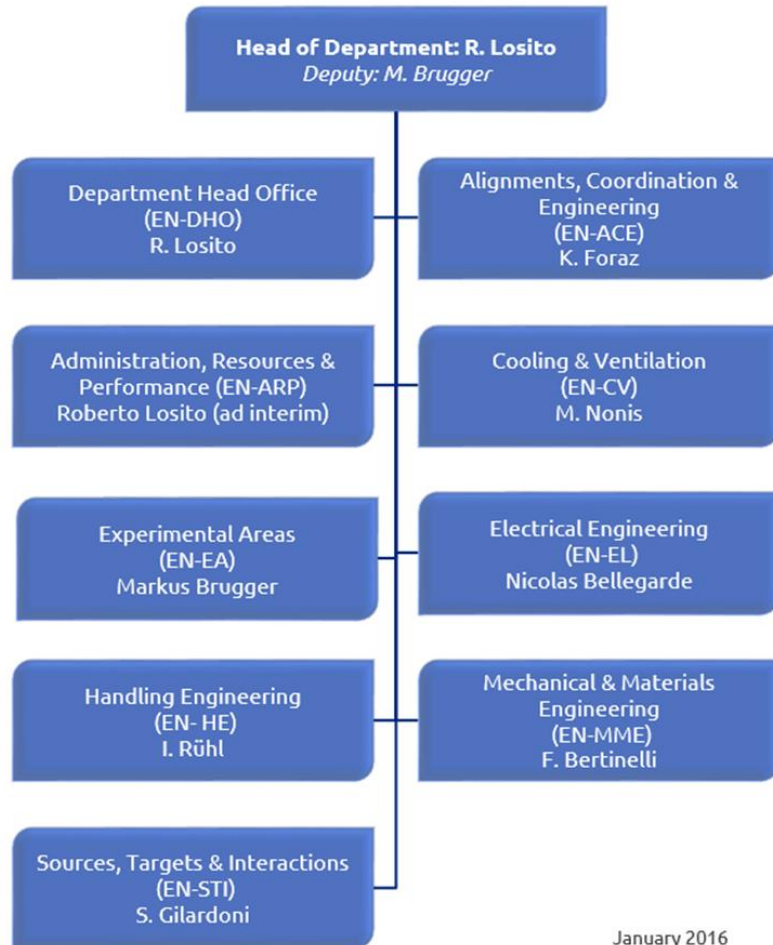
Thierry Lagrange

Site Management and Buildings

Lluís Miralles



Head of Department:
Roberto Losito



- Operation
 - Infrastructure
 - Accelerators
 - Experimental Areas
- Projects
 - Consolidation
 - Upgrades
 - New facilities
 - Design & Manufacturing
- Studies

Who are we, in EN?

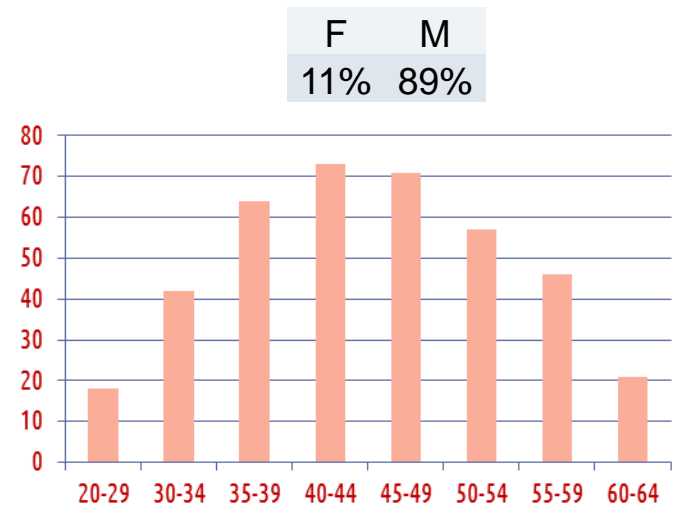
| | | | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|
| AT | BE | CH | D | DK | ES | FI | FR | GB | GR | IT | NL | NO | PL | PT | SE |
| 4 | 22 | 11 | 17 | 2 | 17 | 3 | 225 | 22 | 3 | 41 | 8 | 2 | 5 | 9 | 3 |

| | |
|-------------------------------|-----|
| Scientific & Engineering Work | 150 |
| Technical Work | 200 |
| Manual Work, Crafts & Trades | 28 |
| Administrative Work | 16 |

38%

58%

4%



| | |
|--------------------|------------|
| Staff | 394 |
| Fellows | 79 |
| Doctoral Students | 20 |
| Technical Students | 30 |
| Trainees | 19 |
| Associates | 117 |
| Total | 659 |

+ many colleagues in industrial support contracts

+46 with respect to 2014

CV: The Cooling and Ventilation Group

The mandate The operation and maintenance of the **cooling systems, pumping stations, air conditioning installations and fluid distribution systems** for the PS, SPS and LHC including their experimental areas and **special cooling systems of LHC sub-detectors**. It also provides service to the Computer Centre and some miscellaneous installations.



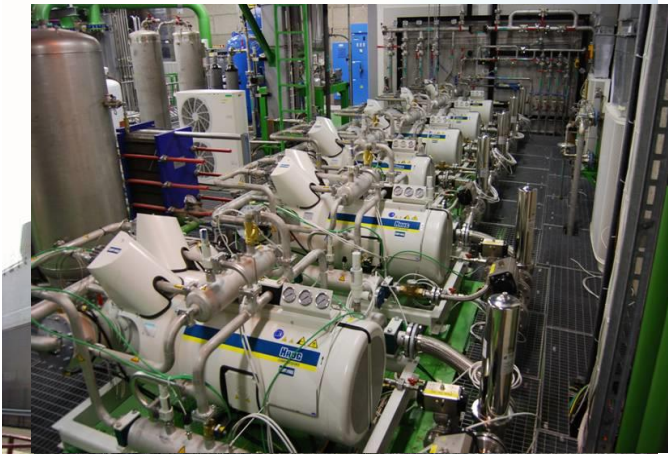
Group Leader
Mauro Nonis



Cooling station

Cooling

| | |
|--|-------------------------|
| Cooling plants (raw, demineralised water, C ₃ F ₈ , C ₆ F ₁₄) | 150 |
| Pipelines | 800 km |
| Hydrants | 800 points |
| Cooling towers (450 MW) | 22 |
| Chilled water plants 6-12 °C (73 MW) | 35 |
| Water network with three pumping stations | 5'400 m ³ /h |



*Equivalent to a small town of 45'000 inhabitants
10% of the water needs of Geneva*

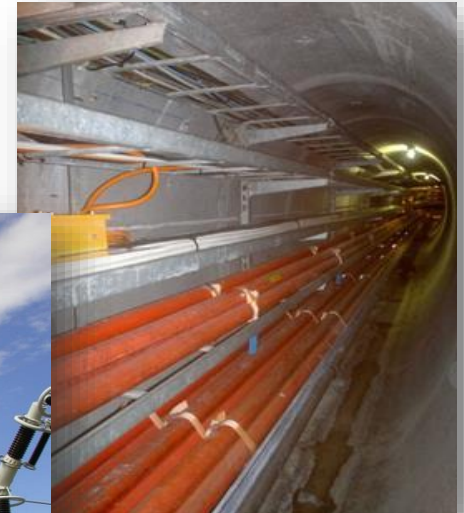
Ventilation

| | |
|---|---|
| Heating, ventilation and air conditioning | 1'500 units from 2'000 to 120'000 m ³ /h each |
| Compressed air | 14 stations 200 km network |

| | km | m ³ /h |
|-------------------|----|-------------------|
| <i>Eurotunnel</i> | 50 | 540'000 |
| LHC | 27 | 290'000 |

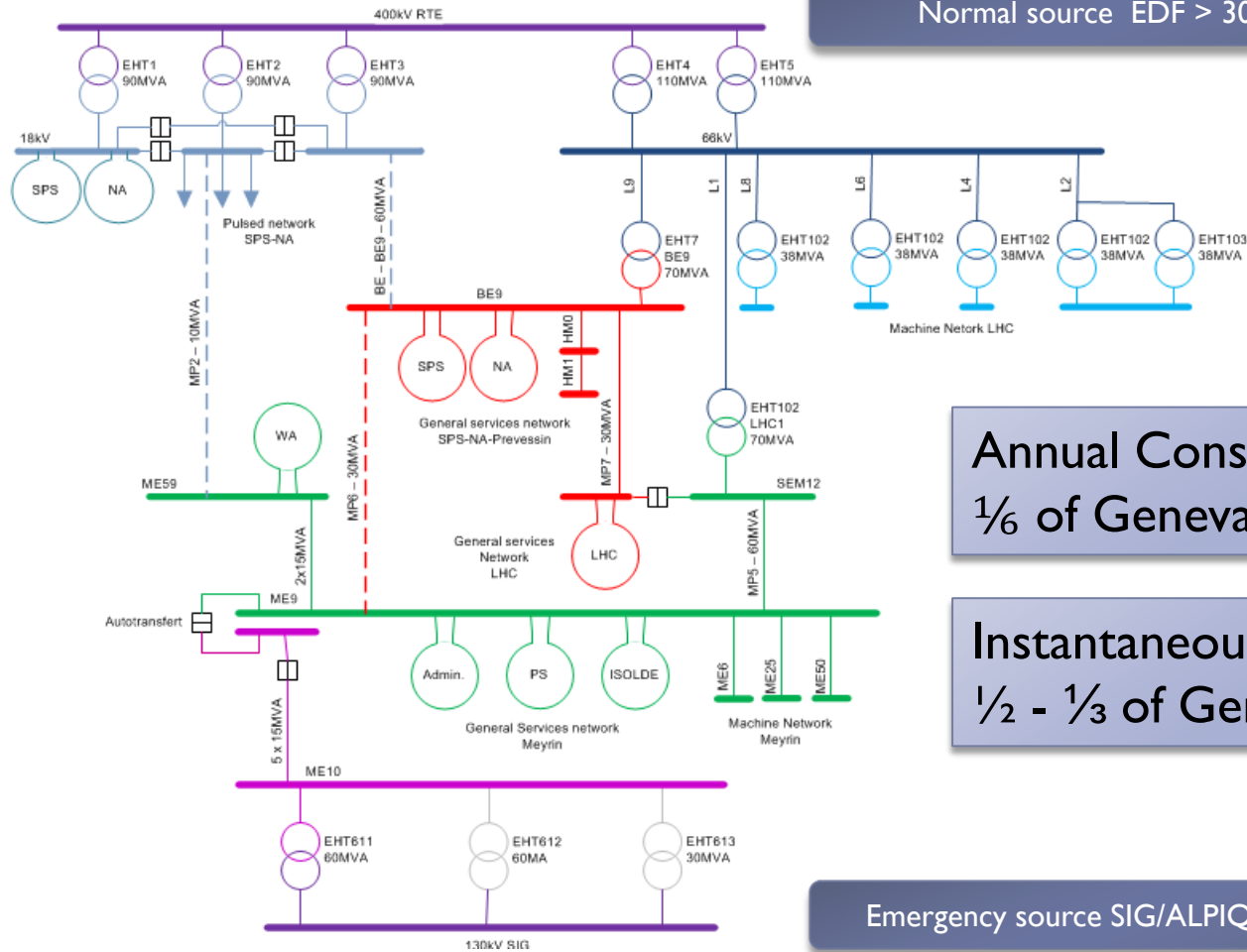


The EL group is responsible for the **CERN electrical distribution network** from 400 kV to 400/230 V. Its main missions are to operate, maintain, extend and renovate the network, analyse and make projections for CERN electrical energy consumption and manage relations with the energy suppliers.



Group Leader
Nicolas Bellegarde

Electricity Distribution



Normal source EDF > 300 MW

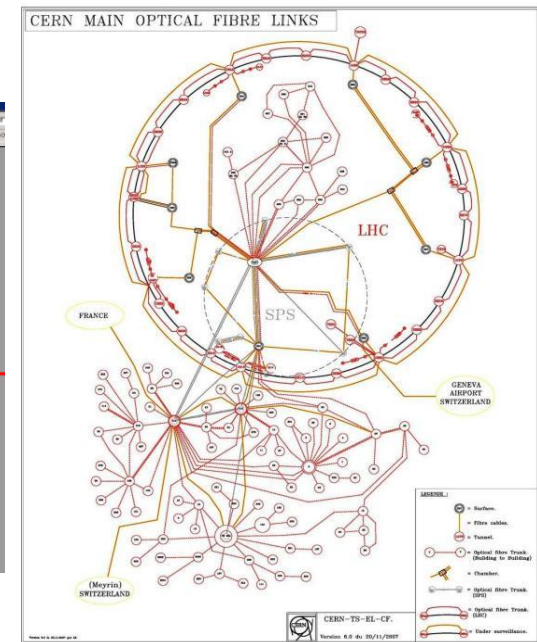
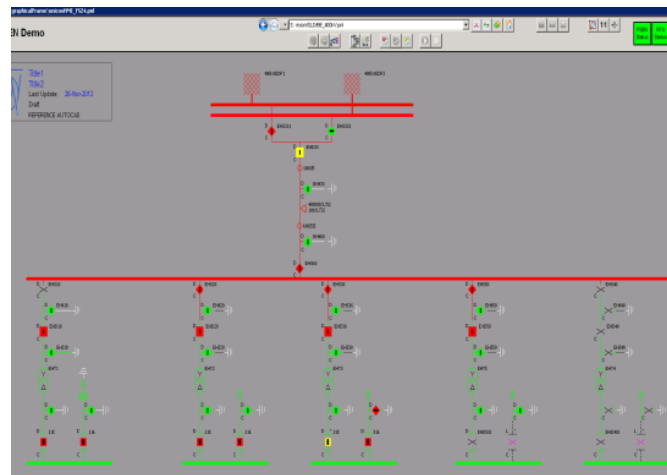
Annual Consumption 1.26 TWh
1/6 of Geneva

Instantaneous Power 180 MW
1/2 - 1/3 of Geneva

Emergency source SIG/ALPIQ ≤ 60 MW

The EL group is also responsible for the **cabling activities**. Its main missions are to install control cables, Water cooled cables and fibre optics for users. This activities include the management of infrastructures (cable trays, ducts, patch panels,...) and the necessary removal of old and unused installations.

EL is also in charge of the control of it's distribution network including a SCADA system and automation of process.



ARP : Administration, Resources and Performance group

The ARP group is in charge of the **management of department resources** in terms of personnel, material, industrial support, as well as **group secretariats**.



Group Leader
Roberto Losito (ad-interim)

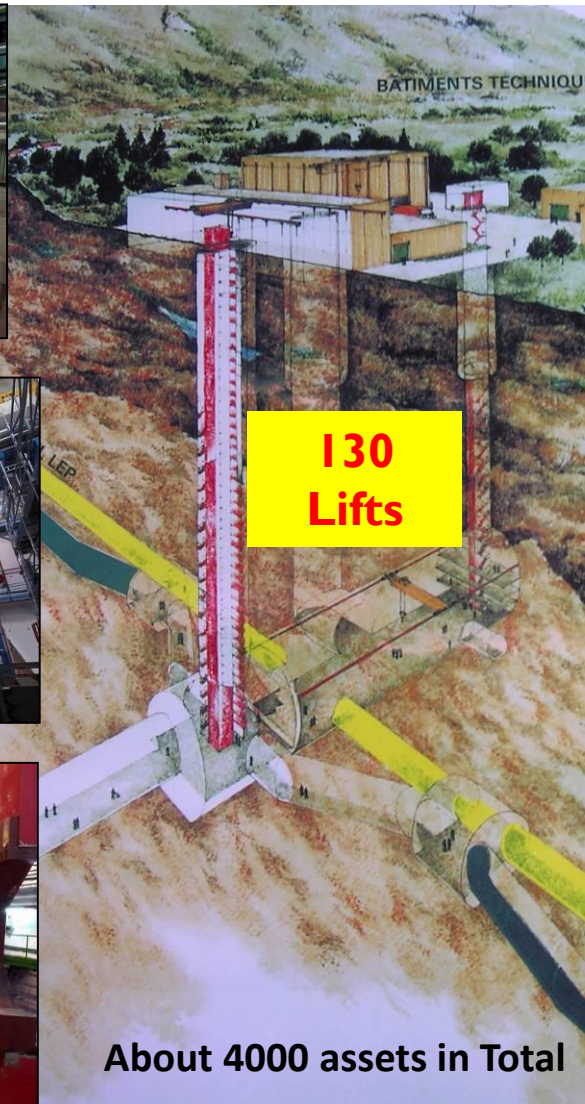
HE : The Transport and Handling Group

The mandate : provide **transport and handling services** for the technical infrastructure of CERN, accelerators and experiments. This includes the design, the tendering/procurement, the installation, the commissioning, the operation, the maintenance and decommissioning of **standard industrial and custom built transport and handling equipment**.



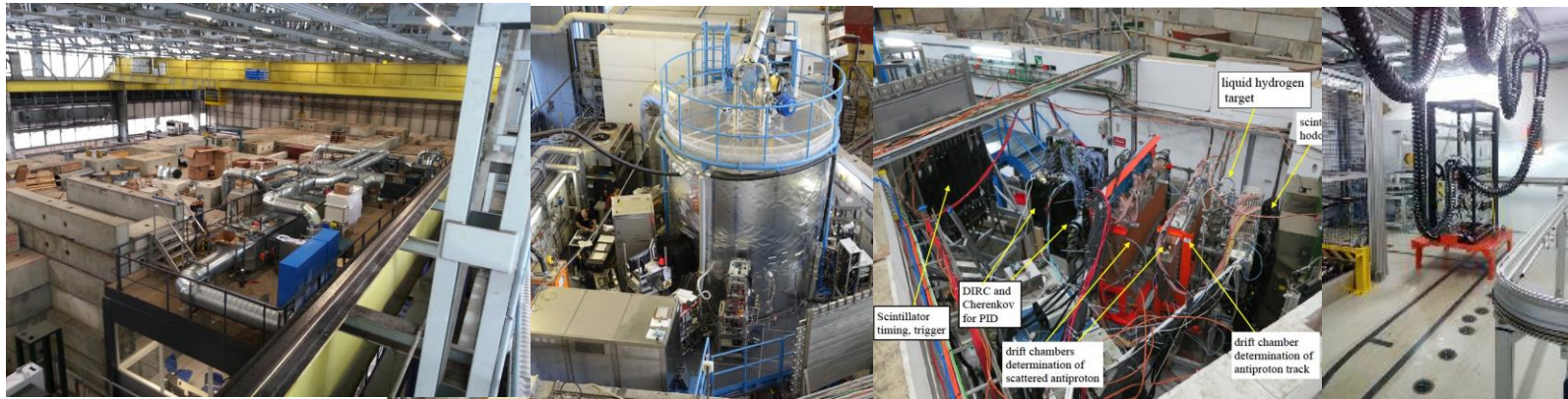
Group Leader
Ingo Ruehl





EA : Experimental Areas Group

The EA Group in the Engineering Department is responsible for the beamlines, infrastructure and management of CERN's experimental areas and provides engineering support and services including associated contracts. EA is furthermore supporting the LHC experiments and managing the respective ATS interface, as well as participating in and partly hosting the management of a number of CERN-wide projects (AWAKE, R2E, etc.).



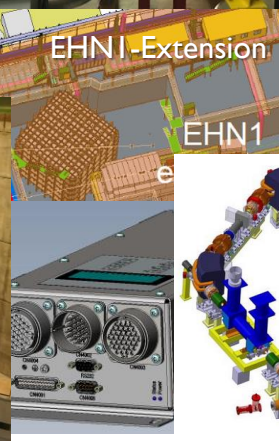
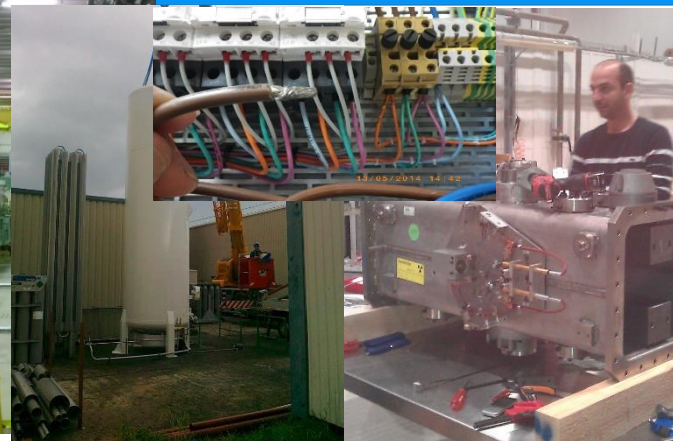
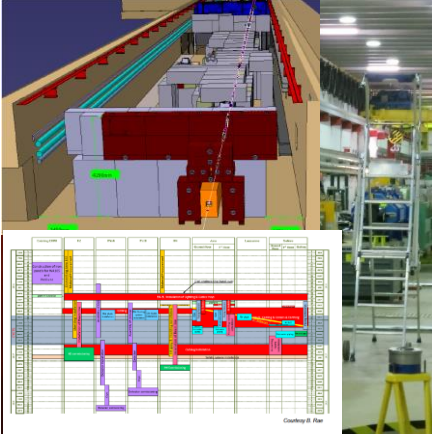
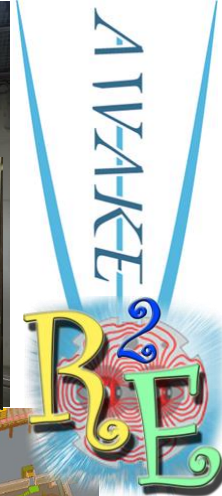
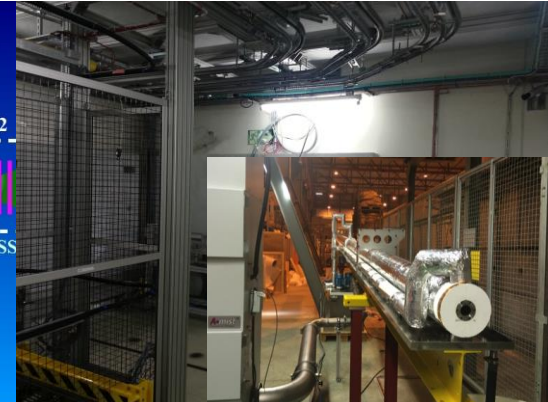
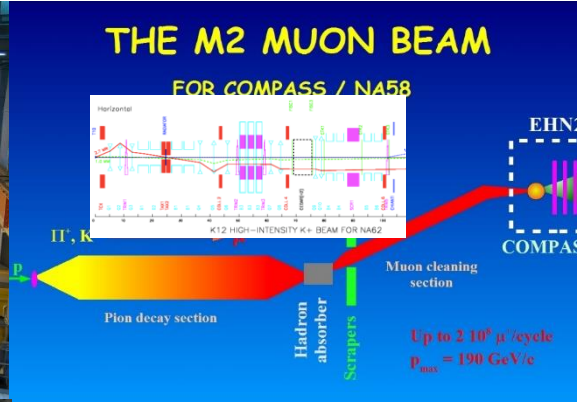
Group Leader
Markus Brugger

EXPERIMENTAL AREAS

BEAMLINES

FACILITIES

PROJECTS



SUPPORT ACTIVITIES

MECHANICS, VACUUM, CABLING, SCAFFOLDING, INTEGRATION, GAS, INSTRUMENTATION, DESIGN, PROTOTYPING, SHIELDING, PLANNING, COORDINATION, SAFETY

EN Engineering Department ACE : Alignment, Coordination and Engineering Group

The ACE group is responsible for

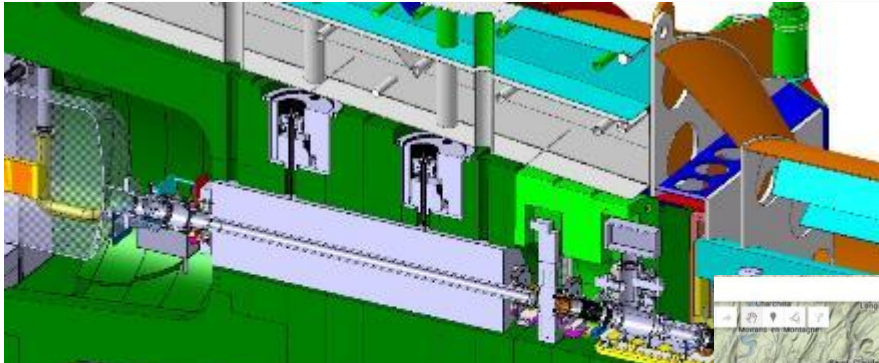
- Providing **overarching project coordination** for the accelerator complex, including layout management, integration, scheduling, work and safety coordination, as well as for different projects.
- Providing **support and expertise in matter of project, risks and quality** management as well as organizational process.
- Developing and supporting the Organization's **engineering, equipment data, maintenance management tools and mechanical CAD systems**.
- The **metrology and alignment** of the accelerators, of their associated beam transfer lines and of the detectors, for the whole CERN site.



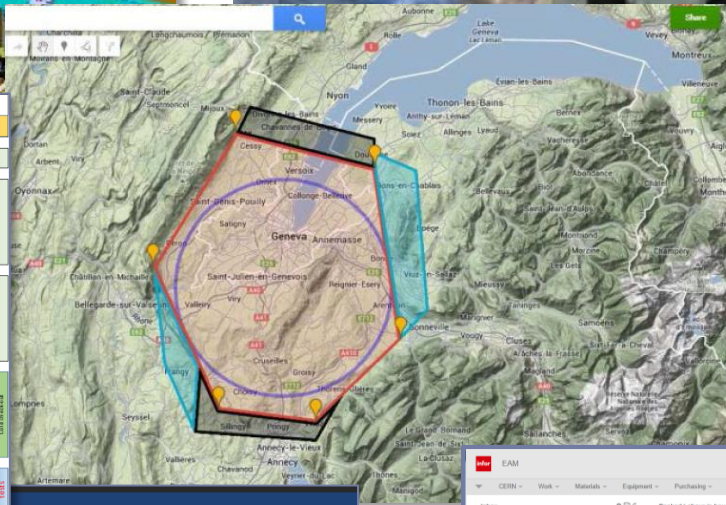
Group Leader
Katy Foraz



EN Engineering Department ACE : Alignment, Coordination and Engineering Group



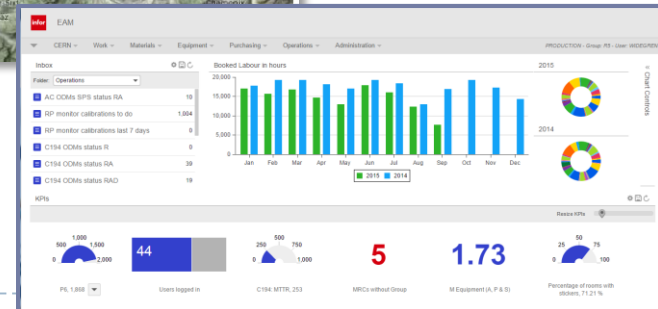
| | 2016 | 2017 | 2018 | 2019 | 2020 |
|-------------|---|---|-------------------|--|---|
| YETS | YETS | eYETS | YETS | LS2 | |
| L4 | 100MeV V | 160MeV Beam Stop & Extraction HET HLS/LSR | Rehabilitat | Interconnectors Beam comb | Connection Beam comb Shut-down Rehabilitat |
| PSB | Cable id. | Cable removal BR, BCTDC electronics, ring trajectory BLM, tune pick- up, kickers | Cable rem. | Wire scanner @11, RF bypasses and BH2 jacks @12, Treatment cavity @13, Extraction kickers @14, PSB injection & extraction upgrade under study; beam stoppers, vacuum window for PSB (Rump) Consolidation of PSB ventilation TBC | Hardware tests Cold check-out |
| PS | Vacuum, fast BLM, Water cooling of 10MHz cavity, inlet hand pick-up | Cable id. | Cable removal | T2 power converters, beam dumps, BWS, under study; position injection septum, bumper, injection kicker, 10MHz syst. of insertion quad.) Consolidation of magnets- TBC | Hardware tests Cold check-out |
| SPS | BAS Cable Vacuum, kicker, MCCs, Beam Dump | BAS Cable removal | BAS Cable removal | BAS REMOVAL SSI reconfiguration, new beam dump, BG, extraction retention, wire scanner, 200MHz RF power, ac coating, MOPOS electronics, ZS Crab-cavities, high bandwidth pick-up | Hardware tests Cold check-out |
| LHC | | MKI proto | | HL LHC: i25 @196, RF: cryo-by-pass & TCLD, TCSPM, TAIN@PS, D1 & D2 mask, Cryogenic @ P4, ac-coating, BGV, FWS, high bandwidth pick-up, DIS, civil engineering | Hardware tests Cold check-out |



EDIMS Home Favourites Index

Home Equipment Buildings & Sites Safety CAD Admin

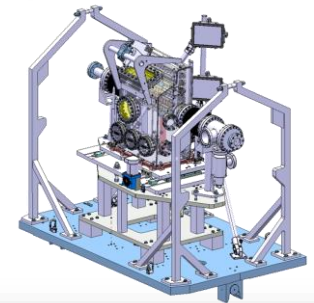
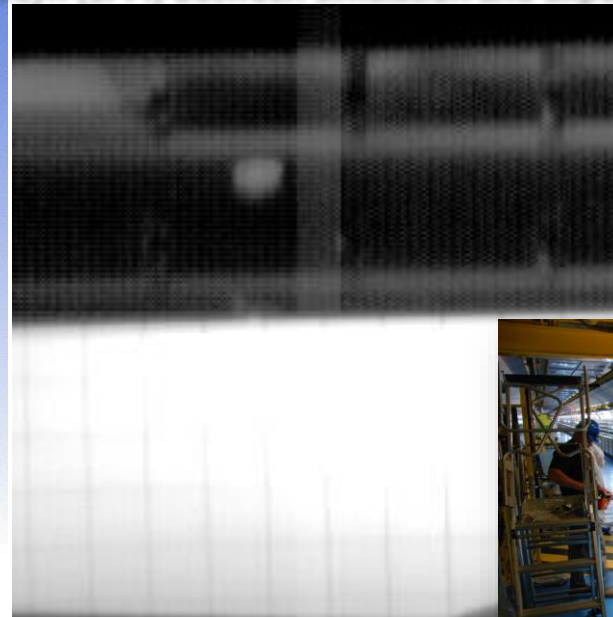
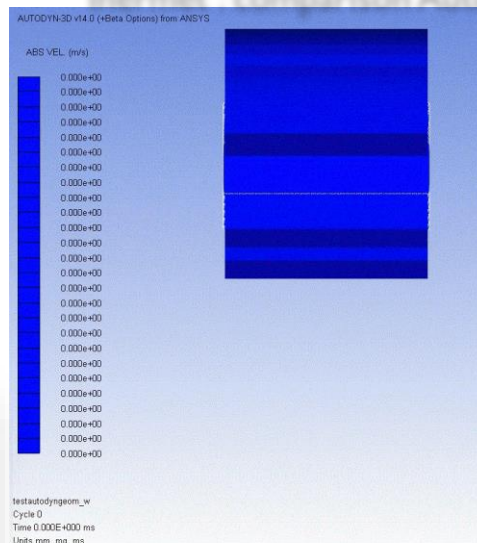
Browse Document search



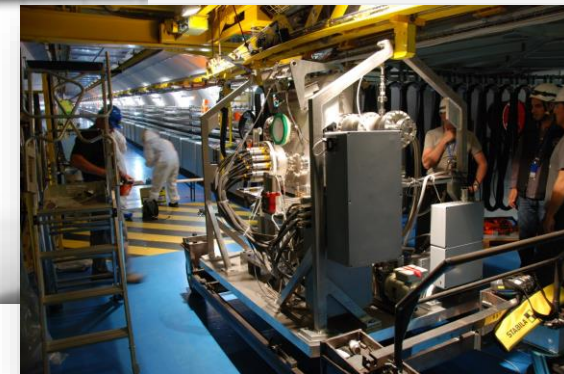
EN Engineering Department MME : The Mechanical and Materials Engineering Group

The mandate : provide to the CERN community specific **engineering solutions combining mechanical design, production facilities and material sciences**. This group owns, maintains and develops the know-how on the mechanical constructions in the accelerators and the physics detectors.

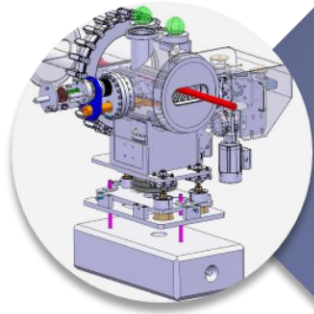
Inernet : comparison Autodyn (SPH) between simulation and experiment



Group Leader
Francesco Bertinelli



domains of activities



Engineering & Design

- Internal Design Office facilities, 40 designers (Staff and Industrial Support)
- CATIA / SmarTeam, ANSYS
- Mechanical measurements lab



Fabrication

- Machining & Maintenance
- Preparation & Subcontracting
- Assembly & Forming

- 4000 m² of internal workshop facilities, 50 technicians (Staff and Industrial Support): CNC machining, sheet metal work & welding, electron beam & laser, vacuum brazing
- External subcontracting service
- Free access Users workshop



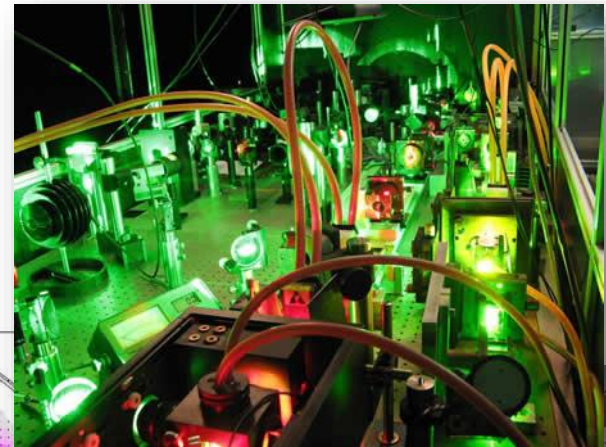
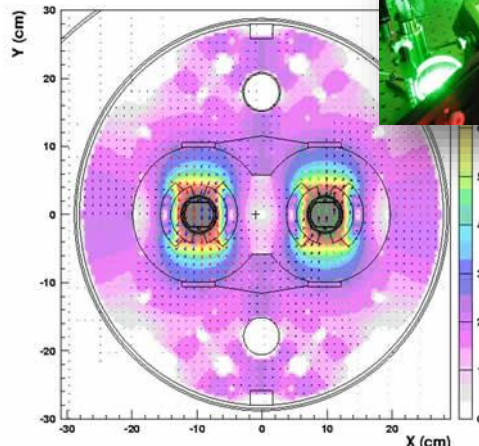
Materials & Metrology

- Material selection, analysis & metallurgy: microscopy, mechanical testing
- NDT: US, radiography, tomography
- 350 m² of internal metrology facilities: CMM

The Sources, Targets and Interactions Group has as common ground the study of **beam interactions with matter**, aiming to apply its know-how to particle generation (ISOLDE Radioactive beam sources, CLIC photoinjectors and polarized $e^+ e^-$ sources), and to particle interception (collimators, absorbers and dumps).



Group Leader
Simone Gilardoni



Welcome !

Presentation prepared by:

S.Baird, F.Bertinelli, O.Capatina, K.Foraz R.Losito, M.Nonis, J.Pedersen,
E.Piemonti Spalazzi, I.Ruehl, G.Richaud, R.Saban, E.Perrin, M. Brugger,
S. Gilardoni.